Geophysical Research Abstracts,
Vol. 11, EGU2009-8583-1, 2009
EGU General Assembly 2009

Coherence theory applied to space radio astronomy: Cassini/RPWS, a practical implementation.

A. Lecacheux

CNRS - Observatoire de Paris, LESIA, Meudon, France (alain.lecacheux@obspm.fr, 33 1 4507 7959)

Solar and planetary, space radio astronomy has taken advantage of several technical and methodological improvements, from the first age - when simple wire antennas and analogue filters were used (RAE, IMP, Voyager) -, later – when spacecraft spin (ISEE, Ulysses) could be exploited for source direction retrieval, and up to now – with the current use of on board digital correlators analyzing multiple wire antennas (Cassini, Stereo).
Indeed, correlation analysis from multiple sensors allows, in principle, the full second order statistics of the analyzed signal to be retrieved, thus providing, with respect to simple antenna system, some extra information on the received radio waves (mainly the spatial brightness distribution and intrinsic polarisation of the observed radio source). In the real case of experiments aboard interplanetary spacecraft, one has to take into account a number of undesirable instrumental effects, for instance the perturbation of the antenna response by the spacecraft conductive body or the limitation of the signal to noise ratio by the available telemetry rate.
In this talk, taking as a working example the Cassini/RPWS data, we develop a consistent statistical model of such a correlator, which allows actual measurements to be easily characterized and reliably inverted. Some results from observations of Jovian and Saturnian radiating sources are provided as illustrative examples.